

USSR

UDC 620.183.48

ITIN, V. I., KOZLOV, Yu. I., PUGINA, L. I., YURCHENKO, A. G., SAVITSKIY, K. V. (Deceased), and FEDORCHENKO, I. M., Institute of Problems of Material Science, Academy of Sciences Ukrainian SSR

"Study of the Sintering, Structure and Phase Composition of Nickel Alloy-Base Metal-Graphite Materials. Report 1. Study of the Sintering Process of Nickel-Base Materials and Both the Structure and Phase Composition of Nickel-Copper-Graphite Alloys"

Kiev, Poroshkovaya metallurgiya, No 10, Oct 71, pp 26-31

Abstract: The study concerns the process of sintering as well as phase and structural changes occurring during sintering in Ni alloy-base metal-graphite materials. The experimental materials comprised 80% Ni and 20% Fe or 20% Cu with 30 and 50% (by vol.) graphite. The addition of graphite to Ni-Cu and Ni-Fe alloys markedly reduces both the amount of shrinkage and its rates during sintering. With 50% graphite the compression gives way to volumetric growth. Cu additions result in greater volumetric growth than Fe additions. The major cause of volumetric growth is believed to be the formation of inclusions isolated between particle surfaces, interaction with oxides to form gases, and desorption gases from the graphite resulting in a breakdown

USSR

ITIN, V. I., et al., Poroshkovaya metallurgiya, No 10, Oct 71, pp 26-31

of contacts. Graphite additions cause the separation of Cu and Ni particles and reduce the alloy's homogeneity. In Cu-Ni alloy-base metal-graphite materials, graphite becomes an inert addition and spreads over the structure in the form of a separate inclusion in the metal matrix -- the solid solution of Cu in Ni. (5 illustrations, 5 bibliographic references)

2/2

USSR

UDC 621.762.04:620.17

FEDORCHENKO, I. M., KORKH, L. M., PUGINA, L. I., PANFILOVA, I. A. and
RUDENKO, V. N., Institute of Problems of Material Science, Academy of
Sciences Ukrainian SSR

"Effect of Technological Factors on the Durability of Sulfidized Iron-
Graphite"

Kiev, Poroshkovaya metallurgiya, No 3, 1972, pp 99-105

Abstract: The strength properties of cermet materials after sintering are governed not only by the composition of the mixture but by a variety of technological factors as well. Varying the alloying efficiency of iron particles with carbon will almost double the strength of sulfidized iron-graphite; raising the dispersity of the starting powders four-fold may increase the material's strength by 30%; reducing the porosity from 30 to 1% will increase the strength characteristics of the material four to five times. Addition of zinc sulfide to alloy the particle contacts with zinc will raise the integral hardness by almost 30%. It has been established that the mechanism of strengthening cermet materials during plastic deformation is determined primarily by the material's initial porosity. (5 illustrations, 2 tables, 11 bibliographic references)

1/1

- 26 -

USSR

UDC 621.165-762.001.45

FEDORCHENKO, I. M., Academician of the Academy of Sciences Ukrainian SSR;
KOSYAK, YU. F., LAZARENKO, A. V., MIROSHNIKOV, V. N., Candidated of Technical
Sciences; KANTEMIR, A. D., and UGOL'NIKOVA, L. A., Engineers

"Full-Scale Tests of Bronze-Graphite Powder Metallurgy Sealing Materials in
PVK-150 Turbine"

Leningrad, Energomashinostroyeniye, No 12, Dec 71, pp 27-29

Abstract: In high- and intermediate-pressure cylinders designed by the
Khar'kov Turbogenerator Plant, minimum clearance over the moving blades is
provided by sealing strips in the stator. Certain heat-resistant materials
should not be used for the strips, e.g. nickel, German silver, Kh18N9Ti steel.
New turbine designs use seals with the strips made in conjunction with the
shroud. Until recently such designs used only cast materials, chiefly iron
alloyed with 6% chromium. Full-scale tests of the nickel-graphite sealing
material UPG-1 in VK-50, VK-100 and K-300 turbines showed that this nickel-
base material is not promising for high-parameter turbines because of inter-
crystalline corrosion. Copper-base materials have proved more promising in
this respect.

1/2

USSR

FEDORCHENKO, I. M., et al., *Energomashinostroyeniye*, No 12, Dec 71, pp 27-29

Full-scale tests were made of bronze-graphite materials in the PVK-150 turbines at the Berezovskaya State Regional Electric Power Station. The experimental materials contain aluminum, iron and manganese as the principal alloying elements, as well as graphite as an antifriction addition. The results indicate satisfactory performance for 10,500 hours. The best materials are brands 43, 53 and 71, which should be used for sealing inserts for high-parameter turbines. The graphite content of the sealing materials should not exceed 3% (by weight). The average clearance was found to increase from 0-0.3 mm in the initial state to 0.8-0.9 mm after the tests. Assembly of the seal unit requires nonconcentric radial clearance. The condition of the rotor strips is satisfactory. The use of bronze-graphite sealing materials can be recommended after check tests in a K-500-240 type turbine.

2/2

- 72 -

USSR

UDC:621.016.2:669.265'24'27

SOLOMIN, S. M., CHERNYSHEV, L. I. and FEDORCHENKO, I. M., Institute of Problems of Material Science, Academy of Sciences Ukrainian SSR

"Effect of Heat Treatment on the Properties of Nickel-Molybdenum and Nickel-Chrome-Molybdenum Powdered-Metal Alloys"

Kiev, Poroshkovaya metallurgiya, No 12, Dec 71, pp 44-48

Abstract: This study concerns the effect of tempering temperatures on the conductivity, notch toughness, shear strength, and corrosion resistance of sintered Ni-30Mo and Ni-15Cr-15Mo alloys. The sintered specimens of the binary alloy were subjected to normalizing from 1180°C (0.5 hr hold time). The sintered specimens of the ternary alloy were normalized from 1200°C (0.5 hr hold time) and tempered at 500-1100°C (1 hr hold time). The experimental results are reflected in curves. Resistivity measurements show that binary sintered Ni-30Mo alloys become markedly brittle and lose both shear strength and corrosion resistance on tempering at 750-800°C. High properties in sintered Ni-30Mo alloys may be achieved by rapid cooling

1/2

USSR

SOLOMIN, S. M., et al, Poroshkovaya Metallurgiya, No 12, Dec 71, pp 44-48
from sintering temperatures to 500°C. The deterioration of properties
in sintered Ni-15Cr-15Mo alloys following tempering is less significant
than in cast commercial grades. This might be attributed to the lower
tendency of sintered ternary alloys (having fewer impurities) to σ -phase
segregation. (4 illustrations, 11 bibliographic references).

2/2

- 20 -

USSR

UDC 621.762

FEDORCHENKO, I. M., OGNEV, R. K., KOLOMOYETS, G. G., ANOKHIN, V. M.,
REISES, V. B., KAZANTSEVA, N. A., and RUTBERG, V. P.

"The Effect of Aluminum and Molybdenum on the Properties of Sintered
Titanium at Room and Elevated Temperatures"

Moscow, Metallurgiya i Khimiya Titana (Institut Titana), Metallurgiya
Publishing House, Vol 6, 1970, pp 111-116

Translation: Results are given from research on the mechanical properties
of the alloys titanium-aluminum, titanium-molybdenum, and triple alloys
titanium-aluminum-molybdenum at room temperature and at temperatures raised
to 300°C. The alloys were obtained by mechanical blending of powders. After
compacting and sintering one time, the alloys studied had a tensile strength
up to 80 gigacalories/mm² and elongation per unit length of 5-16%. Alloy-
ing aluminum and molybdenum increases the heat resistance of sintered
titanium alloys; the short-term strength at 300°C increases by more than
two times. The stress-rupture strength increases significantly during
alloying. Four illustrations, one table, and four bibliographic entries.

1/1

- 65 -

USSR

UDC 621.762:669-496

FEDORCHENKO, I. M.

"Porous Cermet Materials"

Sovrem. probl. poroshk. metallurgii -- V. sb. (Modern Problems of Powder Metallurgy -- collection of works), Kiev, Naukova Dumka Press, 1970, pp 152-162 (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4G476)

Translation: The latest achievements in obtaining and applying porous cermets materials are analyzed. The prospects for their development are demonstrated. There are 9 illustrations and an 8-entry bibliography. [Institute of Applied Mineralogy of the Ukrainian SSR Academy of Sciences].

1/1

- 51 -

USSR

UDC 621.762:669.018.24(088.8)

FEDORCHENKO, I. M., SLYS', I. G., PUGINA, L. I., YERMAKOVA, YE. N.

"Cermets Antifriction Material"

USSR Author's Certificate No 276425, Filed 14 Oct 68, Published 16 Oct 70
(from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4G463P)

Translation: The material, based on stainless steel, contains Fe, C, Cr, and S. In order to improve the supporting capacity and corrosion resistance, Ni is introduced into the material, and the components are taken in the following ratios (in %): Cr 13-32, Ni 0.5-20, S 0.55-7.0, C 0.07-0.8, and Fe for the rest.

1/1

USSR

UDC 621.762

FEDORCHENKO, I. M.

Sovremennyye problemy poroshkovoy metallurgii (Modern Problems of Powder Metallurgy), Kiev, Naukova Dumka Press, 1970, 343 pp, ill., 3 r. 15 k. (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4G385K)

Translation: Reports of USSR and Yugoslavian scientists when attending the school of powder metallurgy and ceramics in Herzeg-Novi (Yugoslavia) are presented. The following topics are discussed: obtaining powders, molding and sintering powder metallurgy materials, surface phenomena and thermodynamic aspects of the sintering process, and properties and methods of obtaining cermet and ceramic materials.

1/1

- 45 -

Powder Metallurgy

USSR

UDC 621.762

FEDORCHENKO, I. M.

"Role of Powder Metallurgy in Engineering and Prospects for Its Development"

Sovrem. probl. poroshk. metallurgii -- V sb. (Modern Problems of Powder Metallurgy), Kiev, Naukova Dumka Press, 1970, pp 5-12 (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4G384)

Translation: An analysis of the modern state of powder metallurgy both in the USSR and abroad and the prospects for its further development to create new materials with special properties (heat-resistant, corrosion-resistant, magnetic, antifriction, contact, friction, porous, fibrous, and so on) is presented. The bibliography has 9 entries. [Institute of Applied Mineralogy of the Ukrainian SSR Academy of Sciences]

1/1

Powder Metallurgy

USSR

UDC:621.762

FEDORCHENKO, I. M. Academician, Academy of Sciences Ukrainian SSR,
Editor

"Modern Problems of Powder Metallurgy"

Sovremennyye Problemy Poroshkovoy Metallurgii [English Version Above],
Kiev, Naukova Dumka Press, 1970, 343 pages

Annotation: This collection contains reports read by scientists of
the Soviet Union and Yugoslavia during the summer school on metal
ceramics and ceramics at Herzeg-Novi (Yugoslavia).

The primary problems of the theory and practice of powder metallurgy
are studied: the production of metallic and nonmetallic powders, the
formation and sintering of metal ceramic and ceramic materials, sur-
face phenomena, and certain thermodynamic aspects of the sintering
process.

1/6

USSR

UDC:621.762

FEDORCHENKO, I. M., *Sovremennyye Problemy Poroshkovoy Metallurgii*, Kiev, Naukova Dumka Press, 1970, 343 pages

The properties and methods of manufacture of various metal ceramic and ceramic materials, such as antifriction, friction, and structural materials, metal ceramic filter and electrical engineering materials are studied; magnetic, refractory materials and products of oxides, refractory compounds, the technology of manufacture of ceramic nuclear fuel and other problems are discussed.

The book is designed for scientific workers and engineers in the area of powder metallurgy, ceramics, materials science, and for students at metallurgical and machine building schools.

TABLE OF CONTENTS

Fedorchenko, I. M.: Powder Metallurgy in Technology and Prospects for its Development

5

2/6

BR -

USSR

UDC:621.762

FEDORCHENKO, I. M., *Sovremennyye Problemy Poroshkovoy Metallurgii*,
Kiev, Naukova Dumka Press, 1970, 343 pages

Preparation of Powders

Skorokhod, V. V.: Methods of Manufacture of Powders and Their Properties	13
Radomysel'skiy, I. D.: Technological Processes in the Production of Iron and Alloy Powders Used in the USSR	21
Meyerson, G. A.: Methods of Production of Refractory Metal Powders	38
Basic Principles of Formation	
Roman, O. V.: Theory and Practice of Pressing of Metal Powders	54
Vinogradov, G. A.: Theory and Practice of Rolling of Metal Powders	61
Theory and Practice of Sintering	
Ristich, M.: Sintering of Polydispersed Crystalline Powders	73
Skorokhod, V. V.: Theory of Solid-Phase Sintering of Metal Ceramic Products	81

3/6

USSR

UDC:621.762

FEDORCHENKO, I. M., *Sovremennyye Problemy Poroshkovoy Metallurgii*,
Kiev, Naukova Dumka Press, 1970, 343 pages

Tresvyatskiy, S. G.: Highly Refractory Systems With Oxides of Rare Earth Elements and Actinides	91
Yeremenko, V. N.: Surface Phenomena and Their Role in Processes of Liquid-Phase Sintering and Saturation of Porous Bodies With Liquid Metals	101
Radovanovich, D.: Thermochemical Aspects of Certain Pro- cesses of Annealing of Ceramics	122
Malich, D., Afgan, N.: Thermodynamics of Irreversible Processes and Phenomena in Metals and Ceramics	127
Problems of Modern Materials	
Mikhaylovich, A.: Significance of Microstructural Studies in the Development of Modern Metal Ceramic Materials	135
Fedorchenko, I. M.: Antifriction and Friction Metal Ceramic Materials	141

4/6

USSR

UDC:621.762

FEDORCHENKO, I. M., *Sovremennyye Problemy Poroshkovoy Metallurgii*, Kiev, Naukova Dumka Press, 1970, 343 pages

Fedorchenko, I. M.: Porous Metal Ceramic Materials	152
Radomysel'skiy, I. D.: Metal Ceramic Structural Parts	162
Frantsevich, I. N.: Metal Ceramic Materials in Electrical Engineering	190
Delich, D.: Physical and Chemical Properties of the Production of Ceramics Based on Titanates	206
Kish, Sh.: Physical and Chemical Principles of the Production of Ferrite Ceramics and Their Properties	215
Sleptsov, V. M., Kosolapova, T. Ya.: Technology of Production and Properties of Refractory Materials for High Temperature Equipment	224
Meyerson, G. A.: Metal Ceramic Technology of Manufacture of Compact Blanks of Refractory Metal Powders	242
Frantsevich, I. N.: New Trends in the Development of High-Strength and Heat-Resistant Materials	253

5/6

USSR

UDC:621.762

FEDORCHENKO, I. M., *Sovremennyye Problemy Poroshkovoy Metallurgii*,
Kiev, Naukova Dumka Press, 1970, 343 pages

- Tresvyatskiy, S. G.: Structure and Strength of Brittle Poly-
crystalline Inorganic Materials 269
- Anastasiyevich, P.: Thermodynamics of Nuclear Fuel Based on
Oxides 287
- Kolar, D.: Influence of the Medium on Sintering of Uranium
Dioxide
- Zhivanovich, B., Mikiyel', V., Ristich, M.: Technology of
Production of Ceramic Nuclear Fuel From Oxides of Uranium
and Modern Trends in its Development 300
- Tresvyatskiy, S. G.: Refractory Materials and Products of
Oxides 312

6/6

50 -

USSR

UDC 621.762.5

KORKH, L. M., PUGINA, L. I., PEREPELKIN, A. V., and FEDORCHENKO, I. M.,
Institute of Problems of Material Science, Academy of Sciences Ukr SSR

"Processes Occurring During Sintering of Iron-Graphite Containing Zinc Sulfide"

Kiev, Poroshkovaya Metallurgiya, No 1 (97), Jan 71, pp 18-22

Abstract: A study was made of the behavior of zinc sulfide -- one of the basic components introduced into iron-graphite cermet materials to improve their antifriction properties. The paper includes a study of the effect of porosity on the variation in chemical composition of ZhGr3Tss4 materials during sintering. The effect of temperature, isothermal holding time, moisture of the protective environment, and its composition (argon, hydrogen) on the intensity of weight loss of the zinc sulfide placed in the heating zone in powdered form was also studied.

It was found that during heating in hydrogen, zinc sulfide can partially decompose. With an increase in the hydrogen temperature and humidity the decomposition intensity increases. During sintering of ZhGr3Tss4 in
1/2

USSR

KORKH, L. M., et al, Poroshkovaya Metallurgiya, No 1 (97), Jan 71, pp 18-22

hydrogen, the decomposition products of the zinc sulfide interact with the surface of the iron particles to form iron sulfide and their solid solution in zinc sulfide. At a sintering temperature above 975°C, a liquid phase is formed in the material -- a sulfide-carbide eutectic enveloping the surface of the iron particles -- which during sintering under pressure gives the material its fibrous structure. With a decrease in porosity, the content of sulfur and zinc in the sintered ZhGr3Tss4 material increases. Thus, the nonporous material contains twice as much sulfur and six times more zinc than the material with a porosity of 20 percent.

2/2

- 35 -

USSR

UDC 621.762.01(088.8)

FEDORCHENKO, I. M., MIROSHNIKOV, V. N., BORODINA, T. I., and SHEVCHUK, Yu. F.

"Compacted Metal Ceramic Material"

USSR Author's Certificate No. 268658, Filed 22/04/58, Published 9/07/70
(Translated from Referativnyy Zhurnal-Metallurgiya, No. 2, 1971, Abstract
No. 2 G421 P)

Translation: A compacted metal ceramic material based on Fe contains metal fluoride. In order to increase the scale resistance, Al is introduced and the components are taken in the following relationship (%): BaF₂ 0.5-15, Al 0.5-25, Fe -- remainder.

1/1

- 34 -

USSR

UDC 66.067.12

ARENSBURGER, D. S., PUGIN, V. S., and FEDORCHENKO, I. M., Institute of Problems of Material Science, Academy of Sciences, Ukrainian SSR

"Technology of Production and Properties of Porous Titanium-Molybdenum Alloy Materials"

Kiev, Poroshkovaya Metallurgiya, No 12, Dec 70, pp 39-42

Abstract: The alloy titanium-30% molybdenum has been found to be highly corrosion resistant in hydrochloric and sulfuric acids at high temperatures. Therefore, this alloy was used in experiments on the production of porous permeable materials. The technology of manufacture and properties of porous titanium materials of this alloy, designed to operate in hot acid solutions, were studied. A technology was developed for diffusion saturation of titanium powders with molybdenum, allowing the production of a corrosion-resistant coating on the surface of titanium particles. The porous permeable specimens manufactured of titanium powder which had been diffusion saturated with molybdenum also have high corrosion resistance and can be recommended for use in hot solutions of non-oxidative acids.

1/1

Miscellaneous

USSR

FEDORCHENKO, I. M., Academician of the Academy of Sciences Ukrainian SSR

"Materials Science and Modern Technological Progress"

Kiev, Vestnik Akademii Nauk Ukrainiskoy SSR, No 11, 1970, pp 51-57

Abstract: The article is a survey of achievements in the field of materials science and problems that remain to be solved, with special emphasis on the work being done in the Ukrainian SSR. Of particular importance are new materials for solving problems in space technology. There was the unique experiment on the welding and cutting of metals in space during the orbital flight of the ship "Soyuz-6" by means of the experimental device "Vulkan," developed by Soviet scientists, which showed for the first time that electrothermal treatment of metals by means of an arc plasma is possible under conditions of a space vacuum and weightlessness. Materials are of great importance for the further development of machine building, with materials created by powder metallurgy methods playing an important role. Work in this field is under way at the Institute of Problems of Material Science of the Academy of Sciences Ukrainian SSR. Promising materials include anti-friction cermets from iron and bronze powders, wear-resistant cermets based on chromium carbide alloys, highly porous cermet filters, new heat-resistant

1/3

USSR

FEDORCHENKO, I. M., Vestnik Akademii Nauk Ukrainskoy SSR, No 11, 1970, pp 51-57

materials based on dislocation theory, and refractory compounds. Progress in machine building and other fields is related to the use of high-quality and pure metals and alloys. Of great importance here is the method developed at the Institute of Electric Welding imeni Ye. O. Paton, Academy of Sciences Ukrainian SSR, for the electroslag refining of consumable electrodes in cooled molds. Electron-beam and plasma-arc refining are other important new methods of special electrometallurgy. The study of inoculation processes has helped to create high-strength case iron with a tensile strength of up to 90-120 kg/mm², replacing carbon and alloy steels. There are already hundreds of thousands of tractors, combines, and other machines equipped with crankshafts of high-strength cast iron, the result of work done by the Institute of Casting Problems, Academy of Sciences Ukrainian SSR. Further progress in machine building and other fields of industry will be helped by the wide use of electric welding and surfacing (Institute of Electric Welding imeni Ye. O. Paton).

There are important problems confronting materials science in connection with power engineering. These include materials for MHD generators, the laser

2/3

USSR

FEDORCHENKO, I. M., Vestnik Akademii Nauk Ukrainskoy SSR, No 11, 1970, pp 51-57

processing of materials, and electrocontact materials for switches. The replacement of copper and lead by aluminum in conductors will be aided by work done at the Institute of Problems of Material Science on a method for making bimetallic steel-aluminum wires by rolling aluminum powder onto a steel core with subsequent stretching to the requisite diameter. Semiconducting and superconducting materials have an important role.

New materials are of great importance for the development of cryogenic engineering. The solution of this problem will signify a new stage in the technological revolution.

3/3

USSR

F

ARENBERGER, D. S., PUGIN, V. S., and ~~REBORSHENKO~~, I. M., Institute for Problems of Material Science, Academy of Sciences Ukrainian SSR

"Investigation of Titanium-Molybdenum Powdered Metal Alloys"

Kiev, Poroshkovaya Metallurgiya, No 4, Apr 70, pp 32-36

Abstract: The physicochemical and physicomechanical properties of powdered metal alloys based on titanium and molybdenum (containing up to 50 wt. % Mo) are reviewed, and production technology is discussed. Molybdenum powder (type MCh) with a particle size of $5-7 \mu$, and titanium calcium hydride, with a particle size of 50μ , were used in the investigation. Specimens, $40 \times 5 \times 4$ and $60 \times 5 \times 5$ mm and porosity $30 \pm 1.5\%$, containing up to 50 wt. % molybdenum, were sintered in argon at $500-1400^\circ \text{C}$. The holding time at the sintering temperature was 2 hrs and the sintered specimens were cooled from 0.4 to 12 hrs, which corresponds to a cooling rate of 3,000 and 100 deg/hr. Data on the shrinkage, porosity, and specific electrical resistance of compacts, depending on the content of molybdenum and sintering temperature, are presented. A diagram of mutual dissolution of titanium and molybdenum during sintering of alloy Ti33Mo and corrosion resistance curves of titanium-molybdenum alloys as a function of alloy composition are shown. The corrosion resistance of alloys with up to

1/2

USSR

ARENSBURGER, D. S., et al, Poroshkovaya Metallurgiya, No 4, Apr 70, pp 32-38

50 wt. % Mo in 20% HCl and 40% H₂SO₄ shows that powdered metal alloys of the composition Ti₃₃Mo, sintered in argon at a temperature of 1200°C, possess the highest corrosion resistance. powdered metal alloys of this composition are recommended for the production of porous permeable materials from titanium-molybdenum powders.

2/2

USSR

F

FERDORCHENKO, I. M., IVANOVA, I. I., and FUSHCHICH, O. I., Institute for Problems of Material Science, Academy of Science, Ukr SSR

"Investigation of the Effect of Diffusion Processes on the Sintering of Metal Powders"

Kiev, Academy of Sciences Ukr SSR, Poroshkovaya Metallurgiya, No 1, Jan 70, pp 30-36

Abstract: The effect of diffusion processes on the sintering of metal powders was investigated in order to establish 1) the possibility of evaluating the diffusion processes by the diffusion constants determined on nonporous cast metals, and 2) the dependence of the intensity of diffusion processes on the distortion of crystal lattices of powder metals. Diffusion coefficients were measured on Fe-Co and Fe-Cu powdery systems at 850, 1200° and 850, 1000°C, respectively, using the method of microspectral analysis. Since the diffusion processes in metals depend to a large extent on the presence of distortion of the crystal lattice and structure defects, experiments to study the penetration of copper into iron were conducted on samples with different degrees of structural irregularities resulting from cold hardening. Curves of the diffusion penetration of copper

1/2

USSR

FEDORCHENKO, I. M. et al, Poroshkovaya Metallurgiya, No 1, Jan 70, pp 30-36

into iron for samples with different initial states are presented. A method suggested by J. G. Fisher was used to determine the predominant diffusion mechanism. The roles of volume and boundary diffusion in both systems were ascertained. The intensity of diffusion processes in powder systems substantially exceeded the intensity in cast metals. Preliminary high-temperature annealing substantially decreased the diffusion coefficients in powdery systems, approximating them to those in cast metals. Because of the considerable intensity of boundary processes, mass transfer in powdery systems can be determined in some cases by the boundary diffusion. Diffusion coefficients for both powdery systems are presented in tables. Orig. art. has: 3 figures, 3 tables, and 5 references.

2/2

- 36 -

Acc. Nr:

AP0049308

Abstracting Service:

CHEMICAL ABST. 5-25

Ref. Code:

4R 0226

F

103158y Effect of diffusion processes on the sintering of metal powders. I. Fedorchenko, I. M.; Ivanova, I. I.; Fushchich, O. I. (Inst. Problems of Powder Metallurgy, Kiev, USSR). *Porosh. Met.* 1970, 10(1), 30-6 (Russ). The diffusion processes in powder bodies were studied with respect to the diffusion constants as determined for pore-free cast metals. The dependence of the intensity of the diffusion processes was studied with respect to the degree of distortion of the crystal lattice of the powder bodies. The diffusion coefficients of powder Fe-Co and Fe-Cu systems were determined at temperatures of 850, 1200, and 850 and 1000°, respectively. Microspectral analysis was used for this work. The intensity of the diffusion processes depends significantly on the degree of distortion of the crystal lattice of the powders and on the metal deformation during pressing. Because of the considerable activity of the boundary processes, the transfer of the material in the powdery systems can be determined in some cases by boundary diffusion. S. A. Mersol

pc

1/1

18

REEL/FRA
19801125

1/2 025 UNCLASSIFIED PROCESSING DATE--27NOV70
TITLE--COMPARISON STUDY OF IRON FLUORIDE MATERIALS IN AIR AND VACUUM -U-
AUTHOR-(04)-ZOZULYA, V.D., MINOSHNIKOV, V.N., FEDORCHENKO, I.M., SHEVCHUK,
YU.F.
COUNTRY OF INFO--USSR
SOURCE--FIZIKO-KHIMICHESKAIA MEKHANIKA MATERIALOV, VOL. 6, NO. 2, 1970, P.
71-74.
DATE PUBLISHED-----70

SUBJECT AREAS--MATERIALS, CHEMISTRY

TOPIC TAGS--CAST IRON, WEAR RESISTANCE, CALCIUM FLUORIDE, CHROMIUM
CONTAINING ALLOY, NICKEL CONTAINING ALLOY, IRON COMPOUND, IRON ALLOY

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--3001/0060

STEP NO--UR/0369/70/006/002/0071/0074

CIRC ACCESSION NO--AP0125895

UNCLASSIFIED

2/2 025

UNCLASSIFIED

PROCESSING DATE--27NOV70

CIRC ACCESSION NO--AP0125895

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. STUDY OF THE ANTIFRICTION PROPERTIES OF WHITE CAST IRON, AND IRON BASED MATERIALS WITH ADDITIONS OF C, CR, NI, AND CaF_2 . THE TESTS WERE CARRIED OUT AT A FRICTION SLIDING RATE OF 0.28 M-SEC AND PRESSURES RANGING FROM 3 TO 25 KG-SQ CM. CERTAIN TECHNIQUES FOR INCREASING THE WEAR RESISTANCE OF MATERIALS ARE EXAMINED. FACILITY: AKADEMIIA NAUK UKRAINSKOI SSR, INSTITUT PROBLEM MATERIALOVEDENIIA, KIEV, UKRAINIAN SSR.

UNCLASSIFIED

1/2 039

UNCLASSIFIED

PROCESSING DATE--20NOV70

TITLE--INVESTIGATION OF TITANIUM MOLYBDENUM POWDERED METAL ALLOYS -U-

AUTHOR--(03)-ARENSBURGER, D.S., PUGIN, V.S., FEDORCHENKO, I.M.

COUNTRY OF INFO--USSR

SOURCE--KIEV, POROSHKOVA YA METALLURGIYA, NO 4, APR 70, PP 32-38

DATE PUBLISHED--APR70

F

SUBJECT AREAS--MATERIALS, MECH., IND., CIVIL AND MARINE ENGR

TOPIC TAGS--POWDER METALLURGY, TITANIUM ALLOY, MOLYBDENUM ALLOY, METAL POWDER, POWDER METAL, SINTERED ALLOY, CORROSION RESISTANCE, ELECTRIC RESISTANCE

CENTRAL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--3001/0100

STEP NO--UR/0226/70/000/004/0032/0038

CIRC ACCESSION NO--AP0125924

UNCLASSIFIED

2/2 039

UNCLASSIFIED

PROCESSING DATE--20NOV70

CIRC ACCESSION NO--AP0125924

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE PHYSICOCHEMICAL AND
 PHYSICOMECHANICAL PROPERTIES OF POWDERED METAL ALLOYS BASED ON TITANIUM
 AND MOLYBDENUM (CONTAINING UP TO 50 WT. PERCENT MO) ARE REVIEWED, AND
 PRODUCTION TECHNOLOGY IS DISCUSSED. MOLYBDENUM POWDER (TYPE MCH) WITH A
 PARTICLE SIZE OF 5-7 MU, AND TITANIUM CALCIUM HYDRIDE, WITH A PARTICLE
 SIZE OF 56 MU, WERE USED IN THE INVESTIGATION. SPECIMENS, 40 TIMES 5
 TIMES 4 AND 60 TIMES 5 TIMES 5 MM AND POROSITY 30 PLUS OR MINUS
 1.5PERCENT, CONTAINING UP TO 50 WT. PERCENT MOLYBDENUM, WERE SINTERED IN
 ARGON AT 500-1400DEGREESC. THE HOLDING TIME AT THE SINTERING
 TEMPERATURE WAS 2 HRS AND THE SINTERED SPECIMENS WERE COOLED FROM 0.4 TO
 12 HRS, WHICH CORRESPONDS TO A COOLING RATE OF 3,000 AND 100 DEG-HR.
 DATA ON THE SHRINKAGE, POROSITY, AND SPECIFIC ELECTRICAL RESISTANCE OF
 COMPACTS, DEPENDING ON THE CONTENT OF MOLYBDENUM AND SINTERING
 TEMPERATURE, ARE PRESENTED. A DIAGRAM OF MUTUAL DISSOLUTION OF TITANIUM
 AND MOLYBDENUM DURING SINTERING OF ALLOY T133MO AND CORROSION RESISTANCE
 CURVES OF TITANIUM MOLYBDENUM ALLOYS AS A FUNCTION OF ALLOY COMPOSITION
 ARE SHOWN. THE CORROSION RESISTANCE OF ALLOYS WITH UP TO 50 WT. PERCENT
 MO IN 20PERCENT HCL AND 40PERCENT H SUB2 SO SUB4 SHOWS THAT POWDERED
 METAL ALLOYS OF THE COMPOSITION T133MC, SINTERED IN ARGON AT A
 TEMPERATURE OF 1200DEGREESC, POSSESS THE HIGHEST CORROSION RESISTANCE.
 POWDERED METAL ALLOYS OF THIS COMPOSITION ARE RECOMMENDED FOR THE
 PRODUCTION OF POROUS PERMEABLE MATERIALS FROM TITANIUM MOLYBDENUM
 POWDERS. FACILITY: INSTITUTE FOR PROBLEMS OF MATERIAL SCIENCE,
 ACADEMY OF SCIENCES UKRAINIAN SSR.

UNCLASSIFIED

1/2 029

UNCLASSIFIED

PROCESSING DATE--20NOV70

TITLE--CERMET DENSIFYING MATERIAL -U-

AUTHOR--(03)--FEDORCHENKO, I.M., KAZANTSEVA, N.A., DUBROV, G.L.

COUNTRY OF INFO--USSR

SOURCE--U.S.S.R. 263,887

REFERENCE--OTSKRYTIYA, IZJEBET., PROM. OBRAZTSY, TOVARNYE ZNAKI 1970,
DATE PUBLISHED--10FEB70

SUBJECT AREAS--MATERIALS, CHEMISTRY

TOPIC TAGS--CHEMICAL PATENT, CHEMICAL COMPOSITION, CERMET, COPPER,
NITRIDE, BORON COMPOUND, NICKEL

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--3004/1817

STEP NO--UR/C482/70/000/000/0000/0000

CIRC ACCESSION NO--AA0132082

UNCLASSIFIED

2/2 029 UNCLASSIFIED PROCESSING DATE--20NOV70
CIRC ACCESSION NO--AA0132082
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A CERMET CONSOLIDATING MATERIAL HAS
THE FOLLOWING COMPN.: CU 21.7-28.1, B NITRIDE 3.0-15.0 WT. PERCENT, AND
NI THE REMAINDER. MGCL.

UNCLASSIFIED

1/2 033 UNCLASSIFIED PROCESSING DATE--13NOV70
TITLE--EFFECT OF DIFFUSION PROCESSES ON THE SINTERING OF METAL POWDERS.
II. ROLE OF DIFFUSION PROCESSES IN THE ACTIVATION OF SINTERING -U-
AUTHOR--(03)--FEDORCHENKO, I.M., IVANOVA, I.I., FUSHCHICH, O.I.
COUNTRY OF INFO--USSR
SOURCE--POROSHKOVAJA MET., FEB. 1970, (2), 14-18
DATE PUBLISHED----FEB70
SUBJECT AREAS--MATERIALS, MECH., IND., CIVIL AND MARINE ENGR
TOPIC TAGS--NICKEL, COBALT, COPPER, PHYSICAL DIFFUSION, POWDER METALLURGY,
IRON POWDER, SINTERED METAL, THERMODYNAMICS
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--2000/0127 STEP NO--UR/0226/70/000/002/0014/0018
CIRC ACCESSION NO--AP0123899
UNCLASSIFIED

2/2 033

UNCLASSIFIED

PROCESSING DATE--13NOV70

CIRC ACCESSION NO--AP0123899

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. CF. IBID., (1), 30; MET. A., 7006-54 0138. THE ACTIVATION OF SINTERING PROCESSES IN FE POWDER CONTG. TRACES OF NI, CO, AND CU WAS STUDIED WITH SPECIAL REF. TO THE PART PLAYED BY THE MUTUAL DIFFUSION OF THE CONSTITUENTS. THE ACTIVATION OF THE SINTERING PROCESS NORMALLY OBSERVED AFTER INTRODUCING TRACES OF OTHER METALS WAS ATTRIBUTED TO THE INTERACTION OF THE ASSOCIATED STRUCTURAL DEFECTS, WHICH FACILITATED DIFFUSIVE CREEP IN THE METAL. THE ACTUAL DIRECTION OF THE DIFFUSIVE FLOW BETWEEN THE PARENT METAL AND THE ADDITIVES WAS PRACTICALLY IMMATERIAL AS REGARDS ACTIVATION. ACTIVATION WAS PARTLY DUE TO THE THERMODYNAMIC INSTABILITY OF THE ADDITIVE IN THE COURSE OF SINTERING AND PARTLY TO THE CREATION OF STRUCTURAL DEFECTS BY THE SINTERING PROCESS ITSELF.

UNCLASSIFIED

1/2 071 UNCLASSIFIED PROCESSING DATE--23OCT70
TITLE--DEVELOPMENT OF PRODUCTION TECHNOLOGY FOR CERMET ALUMINUM AND
INVESTIGATION OF ITS PROPERTIES -U-
AUTHOR--(05)--FEDORCHENKO, I.M., BELOBORODOV, I.I., AFANASYEV, V.F.,
NENAKHOV, A.V., MANYKIN, E.T.
COUNTRY OF INFO--USSR, UNITED STATES
SOURCE--KIEV, POROSHKOVAYA METALLURGIYA, NO 3, MAR 70, PP 39-42
DATE PUBLISHED-----70

SUBJECT AREAS--MATERIALS

TOPIC TAGS--ALUMINUM, POROUS, HEAT TRANSFER, FLUORINE, GRAPHITE, LEAD,
ANTIFRICTION ALLOY, ANTIFRICTION MATERIAL, IMPACT STRENGTH, MECHANICAL
PROPERTY, CERMET

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1997/0409

STEP NO--UR/0226/70/000/003/0039/0042

CIRC ACCESSION NO--AP0119351

UNCLASSIFIED

REEL #7

DODONOV, V.A.

FEDOR CHENKO, I.M.